1. Матвеев В.И., Сидоров Д.Б., Письма в ЖЭТФ, 84, 299 (2006).
2. Матвеев В.И., Гусаревич Е.С., Рябченко С.В., Макаров Д.Н., Письма в ЖЭТФ, 88, 268 (2008).
3. Матвеев В.И., Гусаревич Е.С., Макаров Д.Н., ЖЭТФ, 136, 843 (2009).
4. Salvat F., Martinez J.D., Mayol R., Parellada J., Phys. Rev. A, 36, 467 (1987).

RESEARCH OF SOLAR PANELS USING TO SUPPLY TELECOMMUNICATIONS EQUIPMENT IN THE ARCTIC

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Currently, Russian Federation's priorities are energy consumption and energy saving. The Arctic is of fundamental military-strategic importance for Russia. The development of the Arctic without an advanced telecommunication infrastructure is very difficult. An equipment supply needs energy sources. For a long time, gasoline and diesel generators were traditional energy sources of the Arctic zone. Their work requires regular delivery of fuel and maintenance. In addition, as a result of this activity there is a significant negative influence on the ecology of islands in the Arctic Ocean, such as pollution by exhausts, fuel spill on the soil surface during fuel transportation leading to vegetation removal, amassing of excessive containers. One of the possible solutions of this situation is alternative energy sources, solar panels in particular.

N(A)RFU conducted a research of the possibility of using solar panels on the Cape Desire of Novaya Zemlya island (Latitude: 76 ° 55,54' Longitude: 68 ° 29,22') in collaboration with FGBU "Russian Arctic National Park." We chose solar panels FSM-300 produced domestically. These solar panels are made of monocrystalline solar cells [1], protected with durable glass. Each of these cells produces voltage up to 36.7V, power up to 300W, the total power of the four batteries in set is up to 1200W. Controller Morningstar TS-MPPT-60 with digital display Morningstar TS-M-2, enduring charge current up to 60A, is used for converting the output voltage of solar panels into 24V and battery charging. In case if this system is not able to supply the consumer with needed power in the absence of the sun, the system is powered by four sealed maintenance-free batteries: GEL CHALLENGER G 12-200H 12V, 200Ah. Subsequent conversion from 24V DC to 220V AC for power supply of external circuits is made by the inverter MUST EP 2024 able to hold loads up to 2000W.

In test mode a 100 ohms wire-wound resistor was used as a load resistor, power dissipation is 200 W. The maximum value of power generation that is 638 W (Figure 1) was pointed at 15:00 in the afternoon. Minimum value 46W was observed at 4:00

at night. According to the problem statement to supply the telecommunication equipment it is required not less than 80 W. Solar panels provide the excess of the threshold of 80 W from 07:00 to 23:00. Batteries charge during this time is enough to provide power communications equipment with power from 23:00 to 7:00 at night.

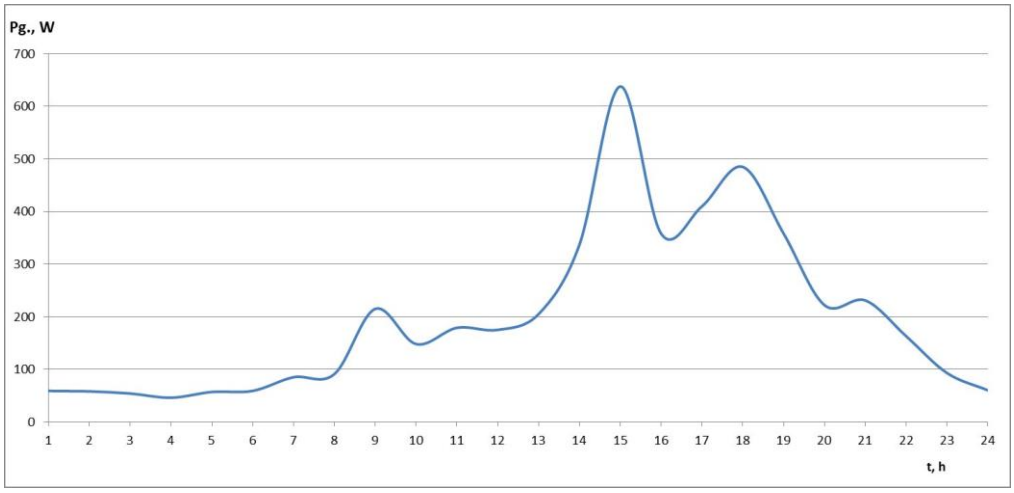

Fig. 1. The dependence of power generation by solar panels on the time of day.

1. Alferov G.I., Andreev V.M., Rumyantsev V.D. Trends and prospects for the development of solar photovoltaic energetics [electronic resource] - Access mode: http://journals.ioffe.ru/ftp/2004/08/p937-948.pdf. Checked 18.03.2016

НАНОВЕСЫ НА ОСНОВЕ ЁМКОСТНОГО ДАТЧИКА С НАНОТРУБКОЙ

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NANOBALANCE ON THE BASIS OF THE CAPACITIVE SENSOR WITH A NANOTUBE

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Nanobalance on the basis of the capacitive sensor with a doubly clamped suspended carbon nanotube is considered. The expressions for the calculation of the frequency dependence of the output current and the mass of the weighed object are obtained.

С развитием нанотехнологий постоянно увеличивается интерес исследователей к устройствам на основе наноэлектромеханических систем (НЭМС). Одной из разновидностей НЭМС являются нановесы – это устройства, предназна-